

## Newton's Washers - Performance Assessment

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

### Problem

How can you determine the mass of a washer, the force of gravity on the washer, and the resistance of friction on the washer, using only a spring scale?

### Suggested Materials

washer

spring scale

string

### Devise a Plan

#### Part 1:

1. Study the available materials and think of a way they could be used to determine the mass & weight of the washer. (*Hint: The acceleration due to gravity is  $9.8m/s^2$ .*)
2. On a separate sheet of paper, make a list of the steps you plan to follow. Include a sketch of the setup you intend to use. Show your plan to your teacher.
3. Once your plan is approved, follow it and make any necessary calculations. Record your results.

#### Part 2:

1. Study the available materials and think of a way they could be used to demonstrate three types of friction.
2. On a separate sheet of paper, make a list of the steps you plan to follow. Include a sketch of the setup you intend to use. Show your plan to your teacher.
3. Once your plan is approved, follow it and make any necessary calculations. Record your results.

### Analyze & Conclude

*On a separate sheet of paper, respond to the questions that follow.*

1. On the sketch of your two setups, use arrows and labels to show the forces acting on the washer. Describe what you are labeling including the actual forces with the appropriate unit.
  
  
  
  
  
  
  
  
  
  
2. In Part 1, how does the washer's weight differ from its mass?
  
  
  
  
  
  
  
  
  
  
3. In Part 1, could you use this method to determine an object's mass on the moon? What changes would you have to make and why?
  
  
  
  
  
  
  
  
  
  
4. In Part 2, what types of friction did you demonstrate involved? How do you know?
  
  
  
  
  
  
  
  
  
  
5. In Part 2, for each type of friction, how could you reduce the friction to move something easier?

### Rubric

Sketch of your setup:

(10 Points) - \_\_\_\_\_ earned

List of steps for procedure:

(10 Points) - \_\_\_\_\_ earned

Results from procedure:

(10 Points) - \_\_\_\_\_ earned

Analyze & Conclude Answers:

(20 Points) - \_\_\_\_\_ earned

**Total Earned:** \_\_\_\_\_